PORTFOLIO

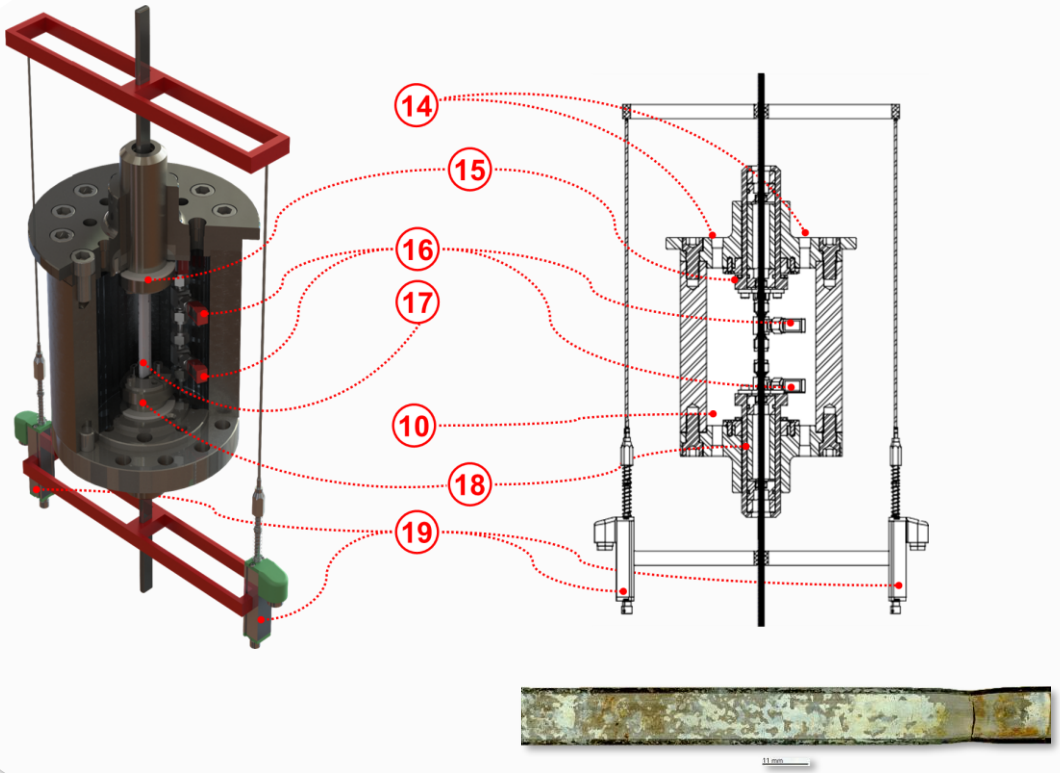
Matheus Porto Trindade

PhD. Materials engineering | Mechanical engineer | Researcher

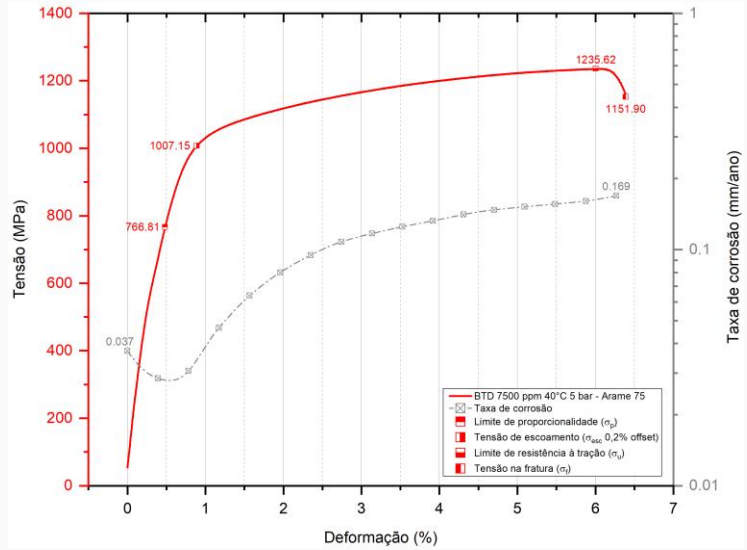
ASTM E-8/G-129 tests

+ Electrochemical testing

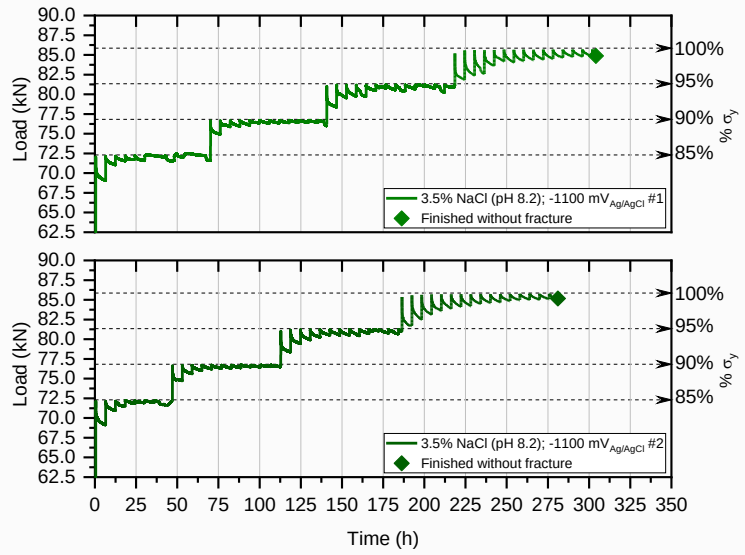
Experienced in conducting Slow Strain Rate Testing (SSRT) in accordance with ASTM E8 and ASTM G129, including test cell design and sizing, solution conditioning, and electrochemical monitoring, which allows an evaluation of mechanical performance and susceptibility to environmentally assisted cracking under controlled conditions.



Schematic diagram of a tensile stress corrosion test cell (as received wire)



Stress-strain curve with corrosion rate evolution measured by LPR



Step-loading test curves (tensile armor wires under -1,1V CP)

ASTM E-8/G-129 tests

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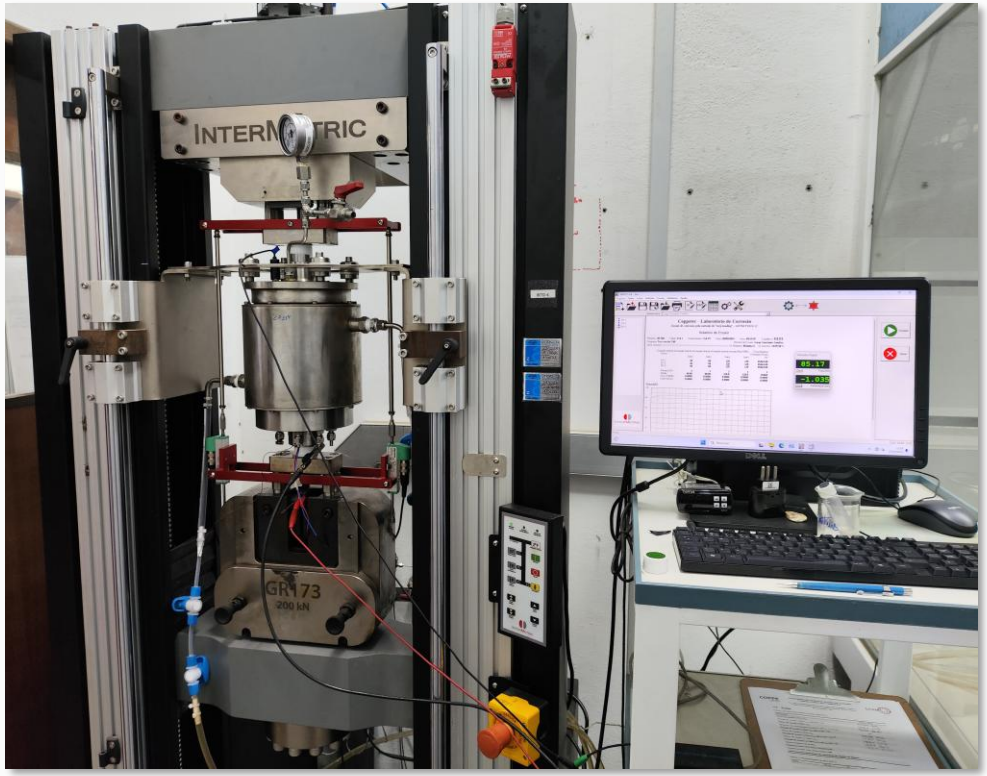
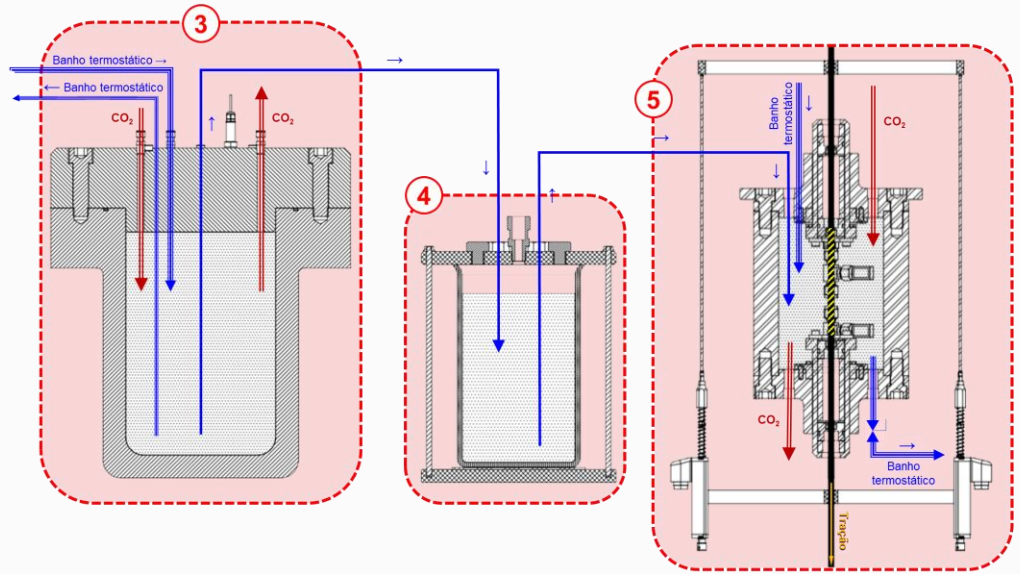
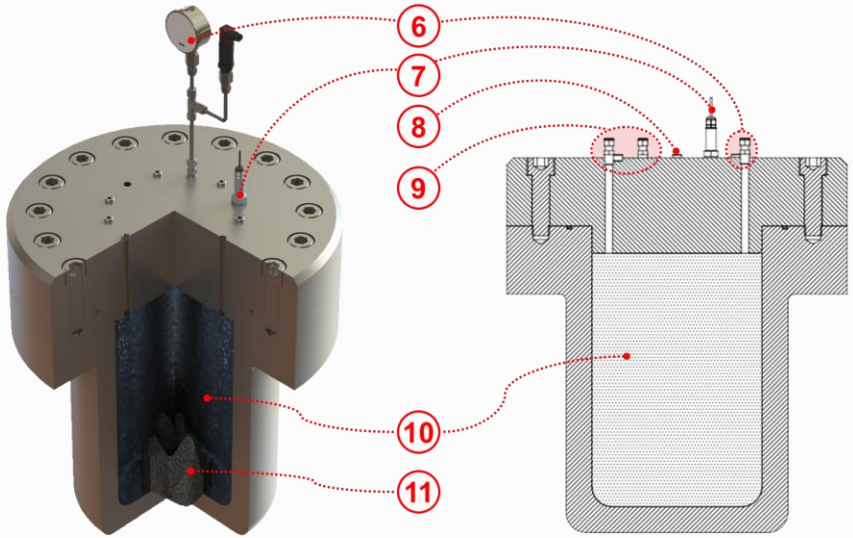


SSR Tensile Testing Equipment (200 kN) + autoclave and electrochemical monitoring



Schematic diagram of solution preconditioning process

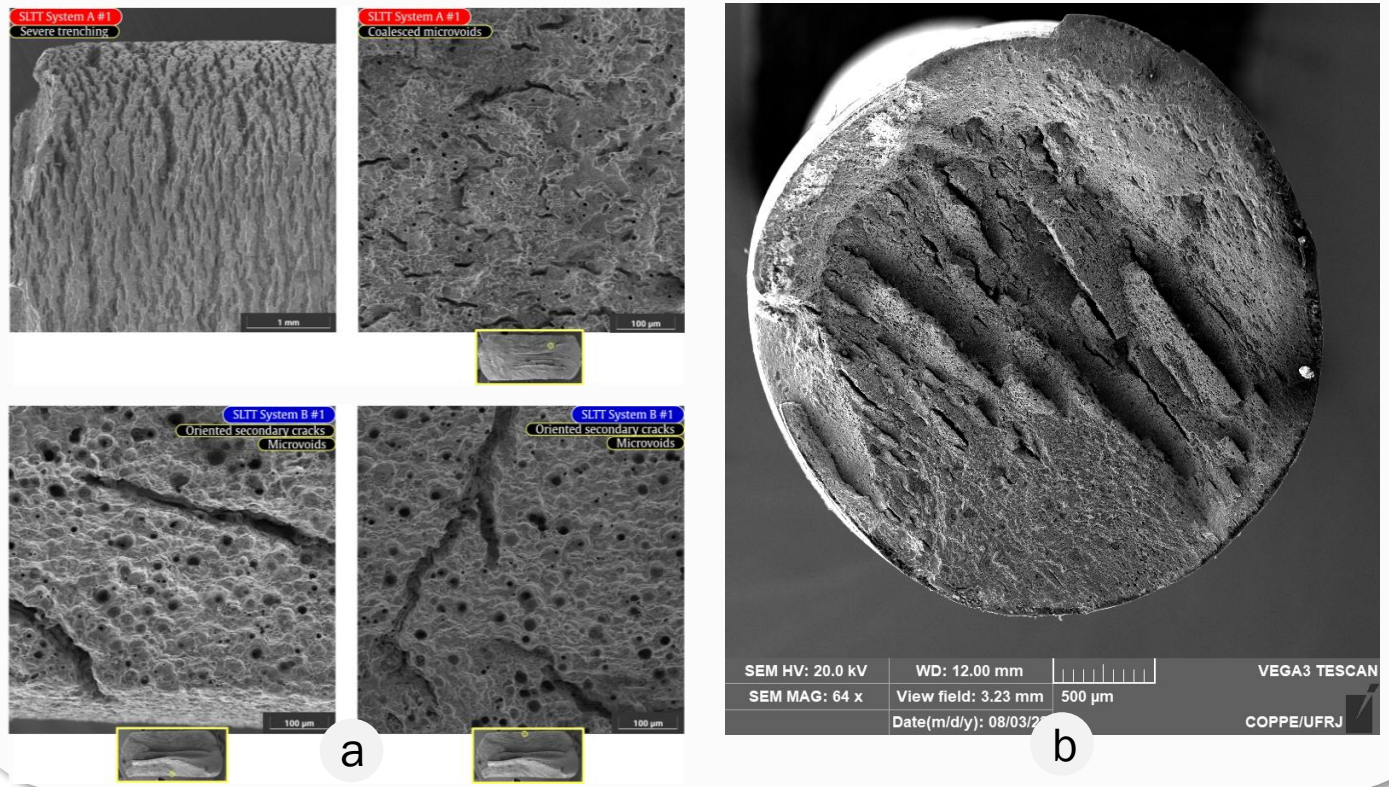


Solution conditioning cell

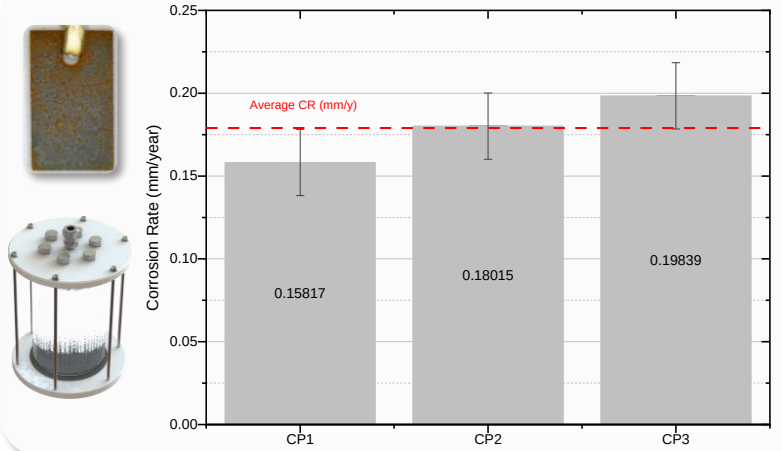
Test data processing

SEM-EDS, OM, fractography, electrochemical (LPR,EIS,WL data)

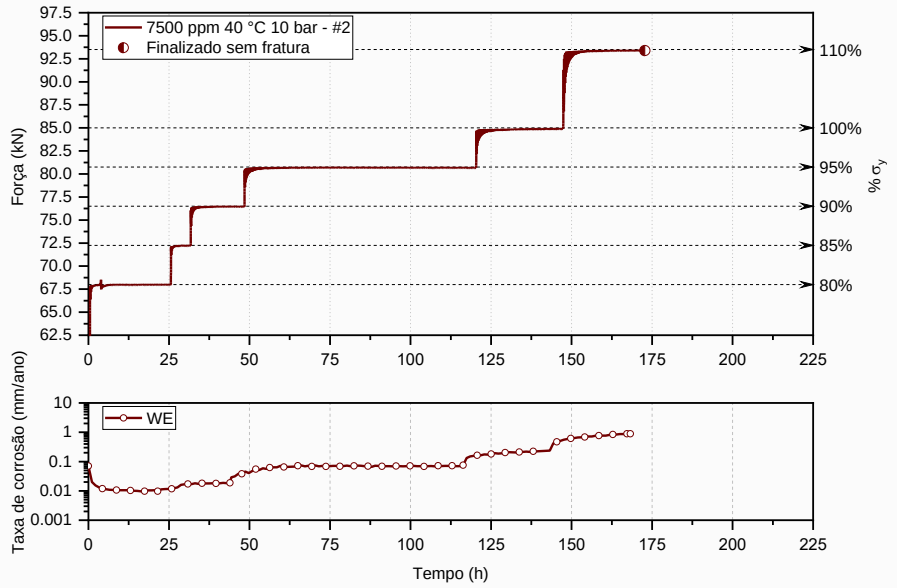
Experienced in test data processing and analysis, including SEM-EDS, optical microscopy (OM), fractography, and electrochemical techniques (LPR, EIS, and weight loss data), supporting comprehensive characterization of corrosion mechanisms and material performance.



a) SEM of fracture surfaces and side views (observation of microvoids and oriented cracking)
b) Fractography of a machined specimen



Mass loss data for samples of zeta pressure armor wire samples

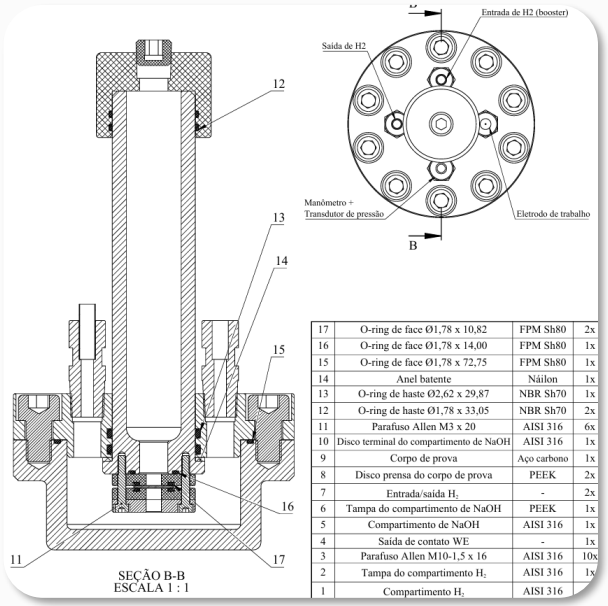


Step-loading + CR curves (a.r. tensile armor wire)

Pressure vessel sizing

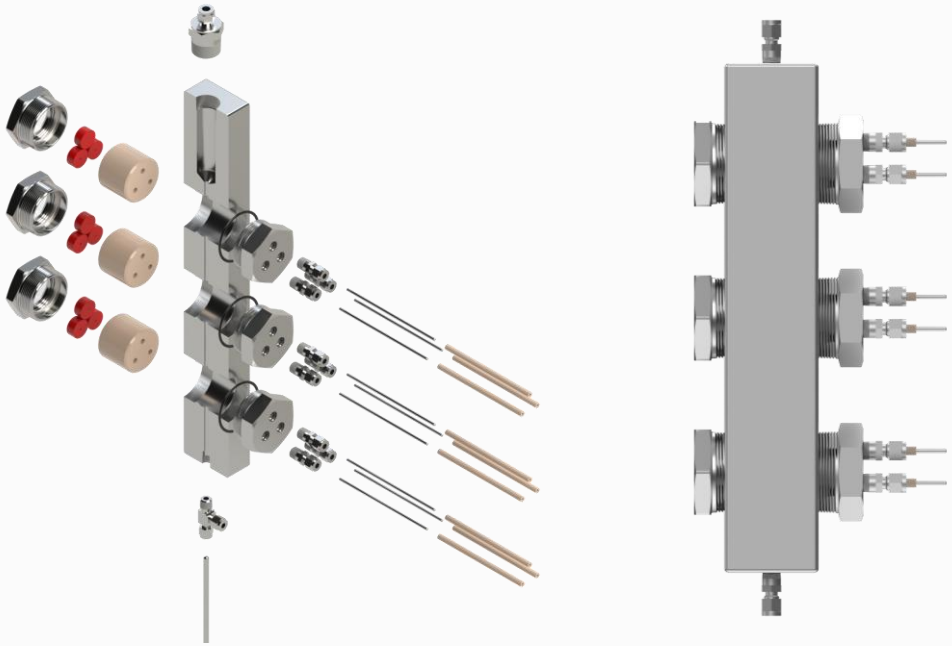
ASME BPVC VIII.1/II.D vessels, Electrochemical cells, permeation cells

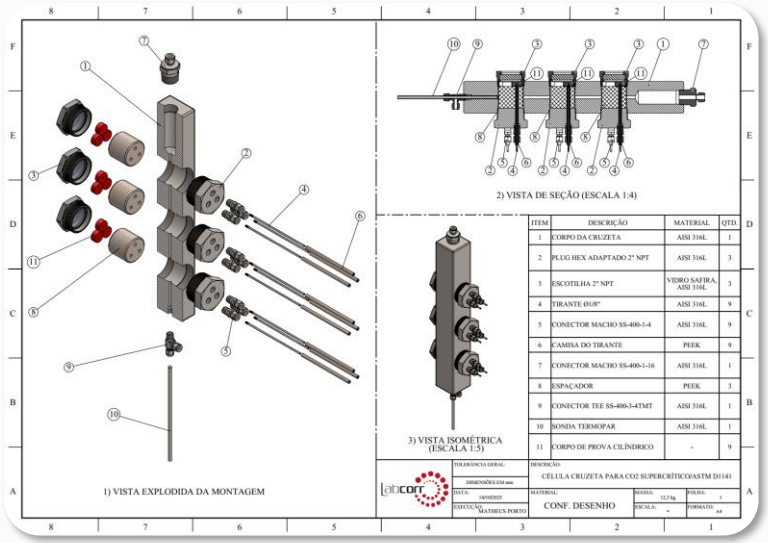
Experienced in pressure vessel sizing and design in accordance with ASME BPVC Section VIII, Division 1 and Section II, Part D, including electrochemical and hydrogen permeation cells, ensuring safe operation and compliance with applicable codes and design criteria.



17	O-ring de face Ø1,78 x 10,82	FPM Sh80	2x
16	O-ring de face Ø1,78 x 14,00	FPM Sh80	1x
15	O-ring de face Ø1,78 x 72,75	FPM Sh80	1x
14	Anel batente	Náilon	1x
13	O-ring de haste Ø2,62 x 29,87	NBR Sh70	1x
12	O-ring de haste Ø1,78 x 33,05	NBR Sh70	2x
11	Parafuso Allen M3 x 20	AISI 316	6x
10	Disco terminal do compartimento de NaOH	AISI 316	1x
9	Corpo de prova	Aço carbono	1x
8	Disco prensa do corpo de prova	PEEK	2x
7	Entrada/saída H_2	-	2x
6	Tampa do compartimento de NaOH	PEEK	1x
5	Compartimento de NaOH	AISI 316	1x
4	Saída de contato WE	-	1x
3	Parafuso Allen M10-1,5 x 16	AISI 316	10x
2	Tampa do compartimento H_2	AISI 316	1x
1	Compartimento H_2	AISI 316	

Adapted hydrogen permeation cell (pressurized H2 charging chamber)




1) VISTA EXPLODIDA DA MONTAGEM
2) VISTA DE SEÇÃO (ESCALA 1:4)
3) VISTA ISOMÉTRICA (ESCALA 1:5)
CÉLULA CRUZETA PARA CO2 SUPERCRÍTICO/ASTM D1141
CONF. DESENHO

ITEM	DESCRIÇÃO	MATERIAL	QTD.
1	CORPO DA CRUZETA	AISI 316L	1
2	PLUG HEX ADAPTADO 2" NPT	AISI 316L	3
3	ESCOTILHA 2" NPT	VIDRO SAFIRA, AISI 316L	3
4	TIRANTE Ø1/8"	AISI 316L	9
5	CONECTOR MACHO SS-400-1-4	AISI 316L	9
6	CAMISA DO TIRANTE	PEEK	9
7	CONECTOR MACHO SS-400-1-16	AISI 316L	1
8	ESPAÇADOR	PEEK	3
9	CONECTOR TEE SS-400-3-4TMT	AISI 316L	1
10	SONDA TERMOPAR	AISI 316L	1
11	CORPO DE PROVA CILÍNDRICO	-	9

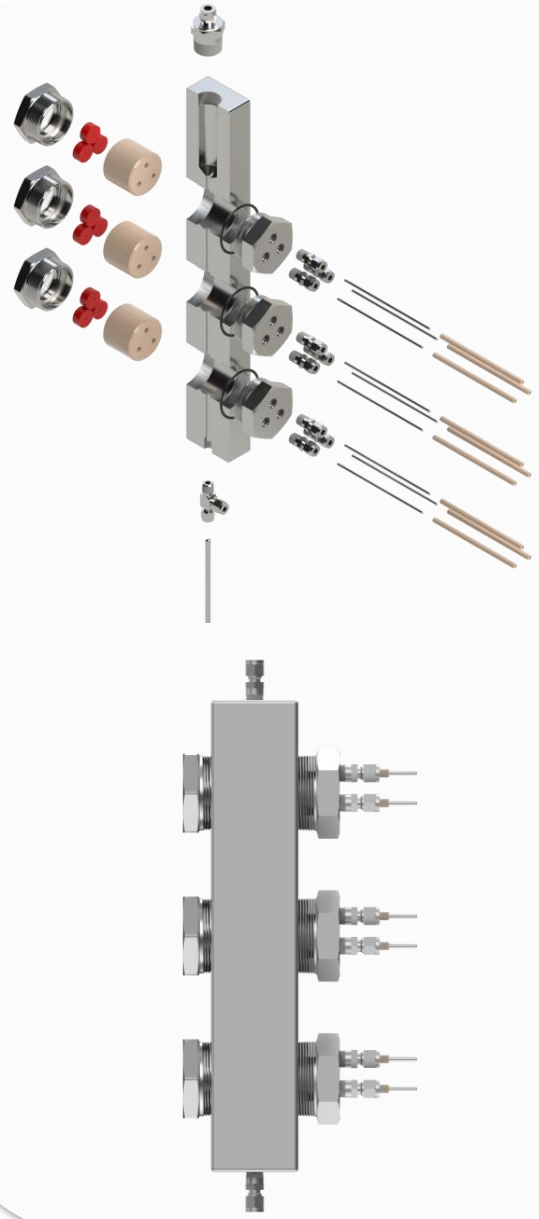
Modulated crosshead for supercritical CO_2 at low V/S

Pressure vessel sizing

ASME BPVC VIII.1/II.D vessels, Electrochemical cells, permeation cells

Experienced in pressure vessel sizing and design in accordance with ASME BPVC Section VIII, Division 1 and Section II, Part D, including electrochemical and hydrogen permeation cells, ensuring safe operation and compliance with applicable codes and design criteria.

Adapted hydrogen permeation cell (pressurized H2 charging chamber)



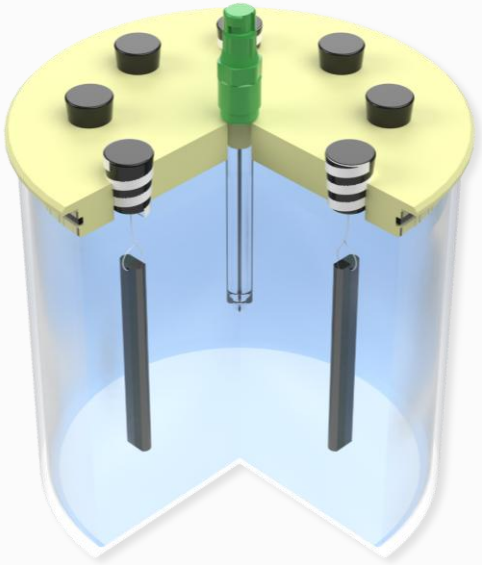
Modulated crosshead for supercritical CO_2 at low V/S. First gas leak test

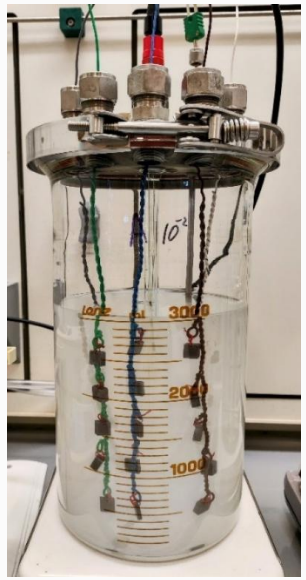
Testing cell sizing

Permeation cells, LPR/OCP/PDP cells

Experienced in test cell sizing and design, including hydrogen permeation cells and electrochemical cells for LPR, OCP, and PDP measurements, ensuring proper geometry, sealing, and instrumentation for reliable and reproducible testing.

Acrylic hydrogen permeation cell



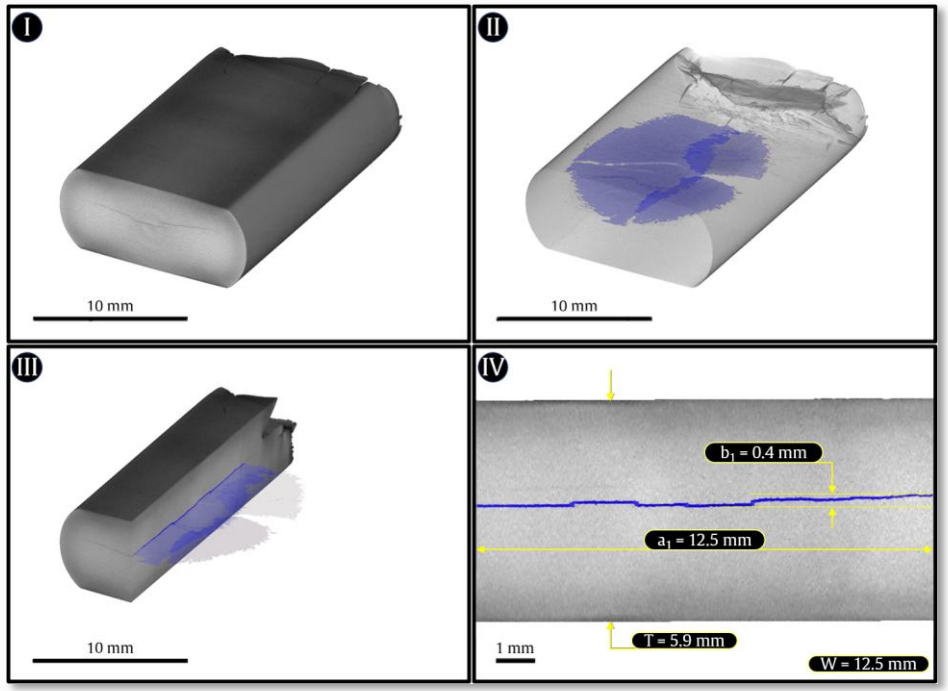


Hydrogen-charging/HIC cells

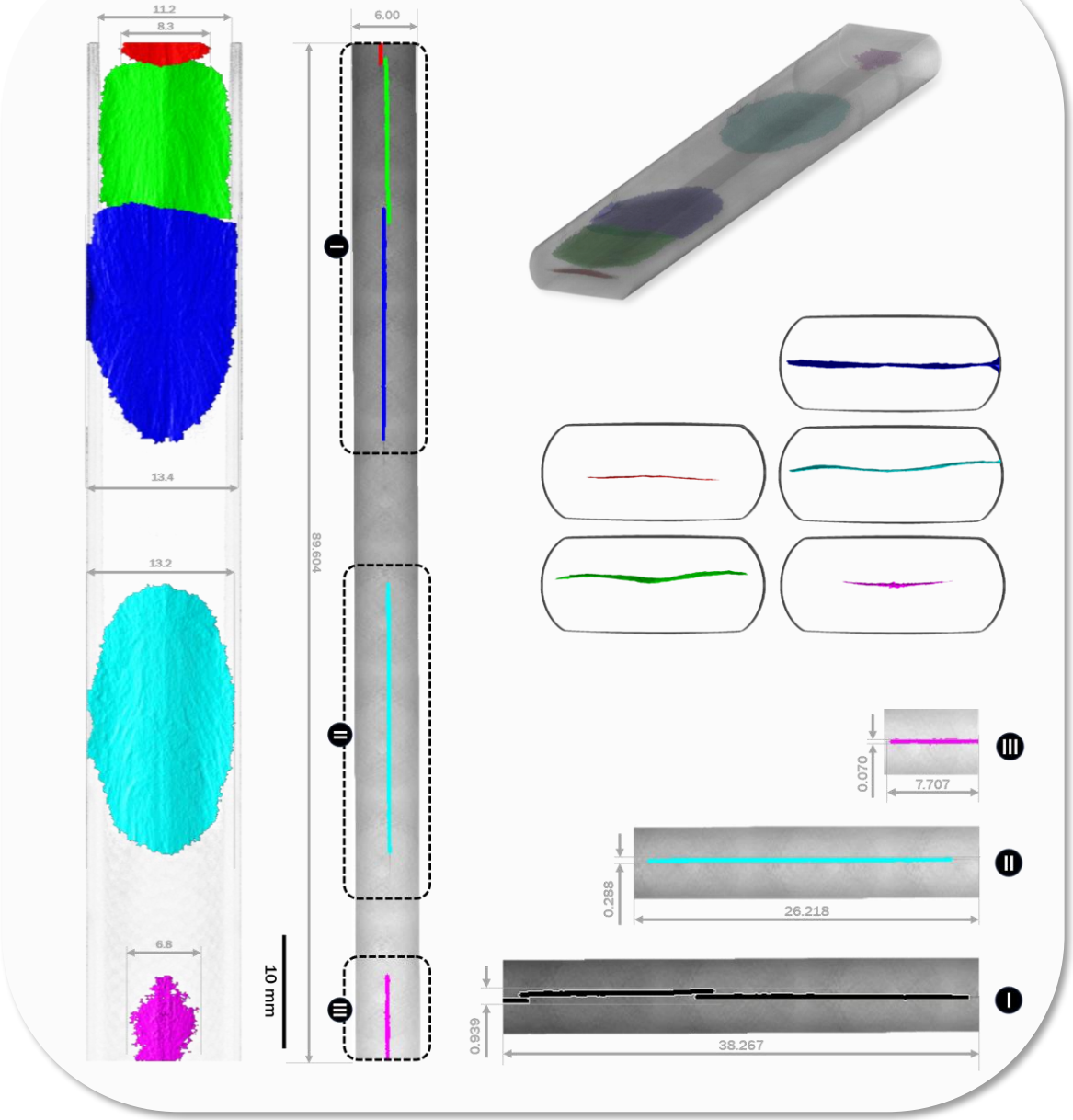
CT internal anomalies segmentation

Post-test internal cracking; 3D x-ray microscopy

Experienced in CT-based internal anomaly segmentation, including post-test internal cracking analysis using 3D X-ray microscopy, enabling detailed visualization and quantification of subsurface damage.



Segmentation of internal fracture in a tensile armor wire following SSRT

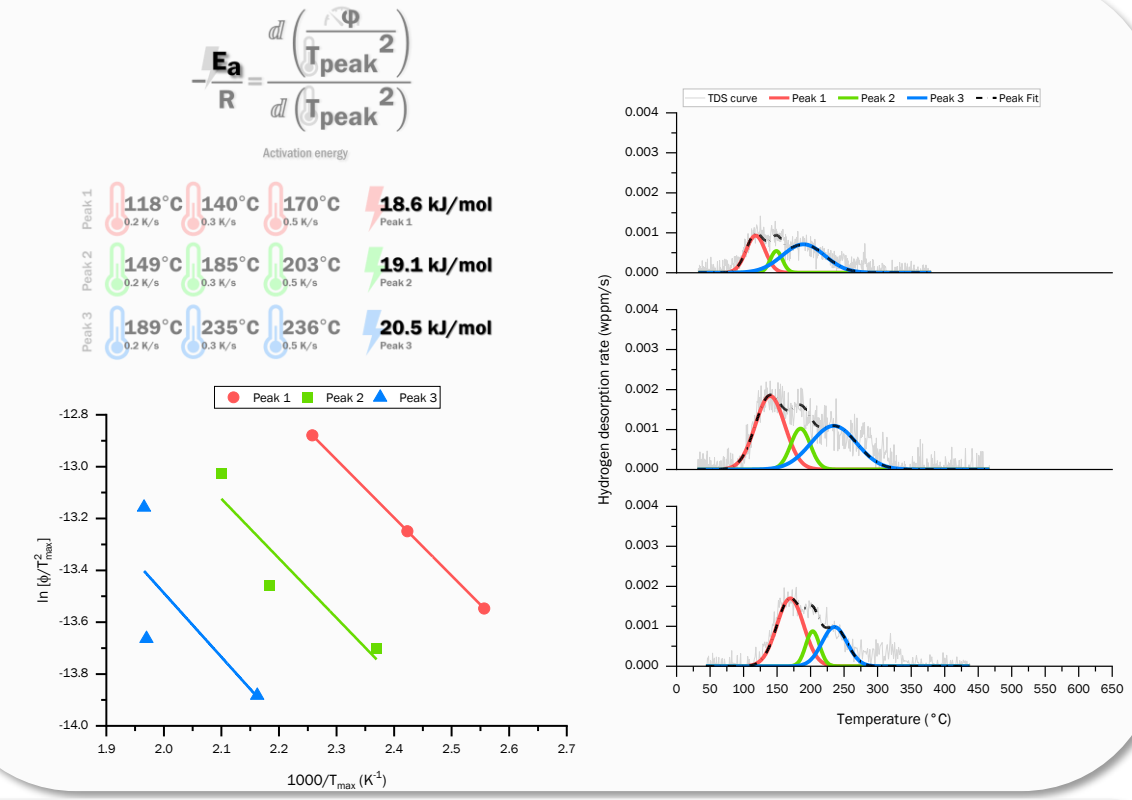


Segmentation of internal cracks (from CT) in HSCS tensile armor wire using HIC

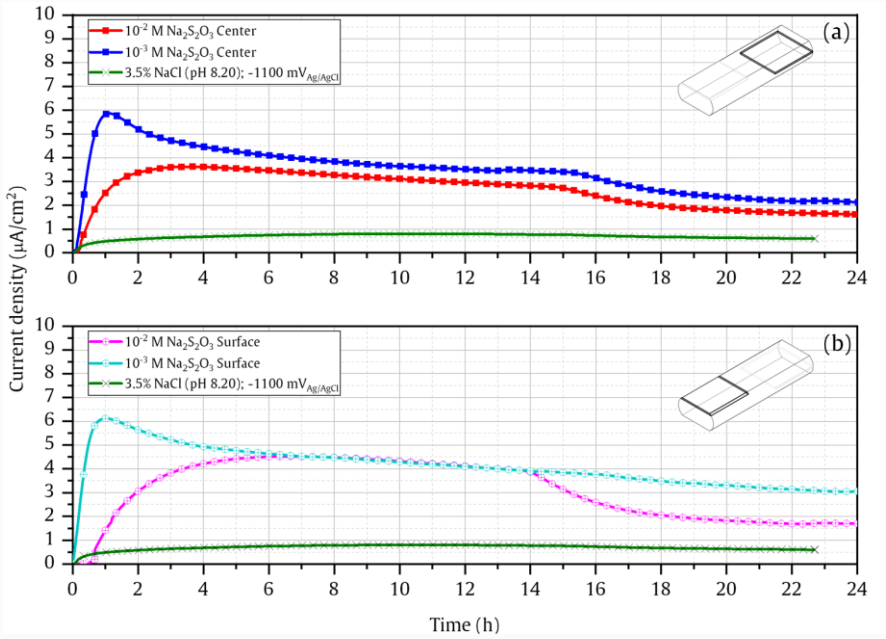
Hydrogen test matrix planning

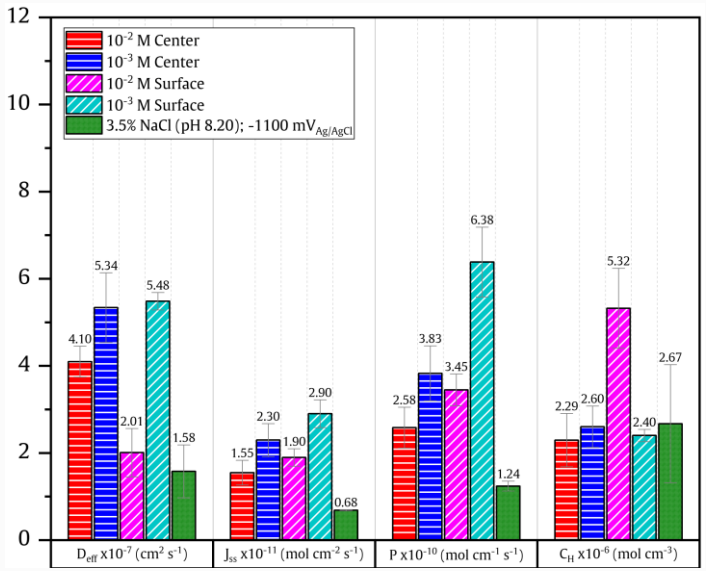
Desorption tests, permeation tests

Experienced in hydrogen test matrix planning, including desorption (TDS) and permeation testing, enabling systematic evaluation of hydrogen uptake, transport, and trapping behavior under controlled conditions.



TDS spectra and actiovation energy from H-charged tensile armor wires



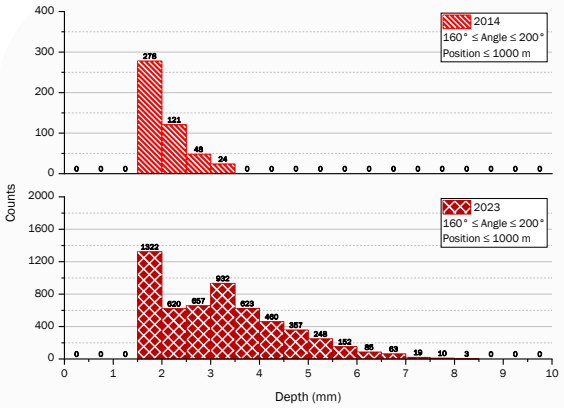


H-permeation curves and data from different tensile armor wire sections

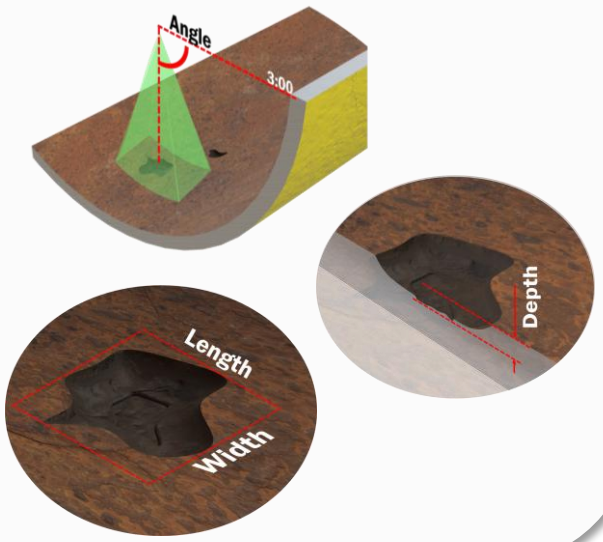
Raw data statistical analysis

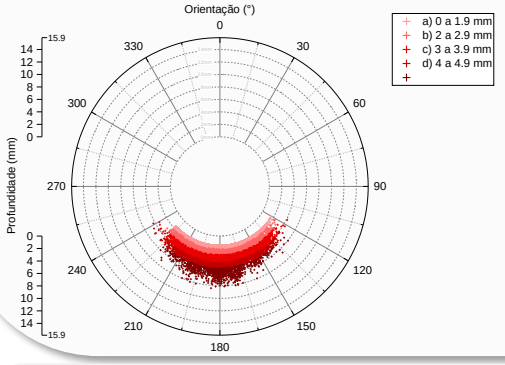
Descriptive statistics, frequency scattering, heatmap, KDE

Experienced in raw data statistical analysis, including descriptive statistics, frequency distribution/scatter analysis, heatmaps, and kernel density estimation (KDE), enabling robust interpretation and visualization of complex datasets.

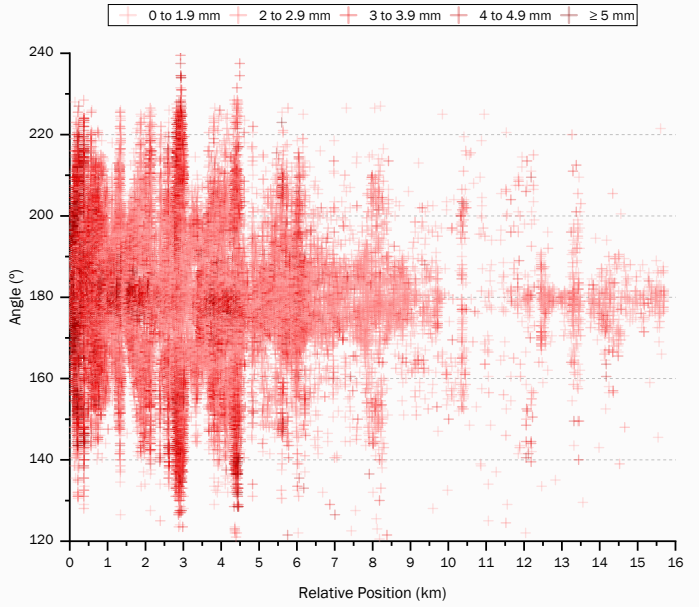


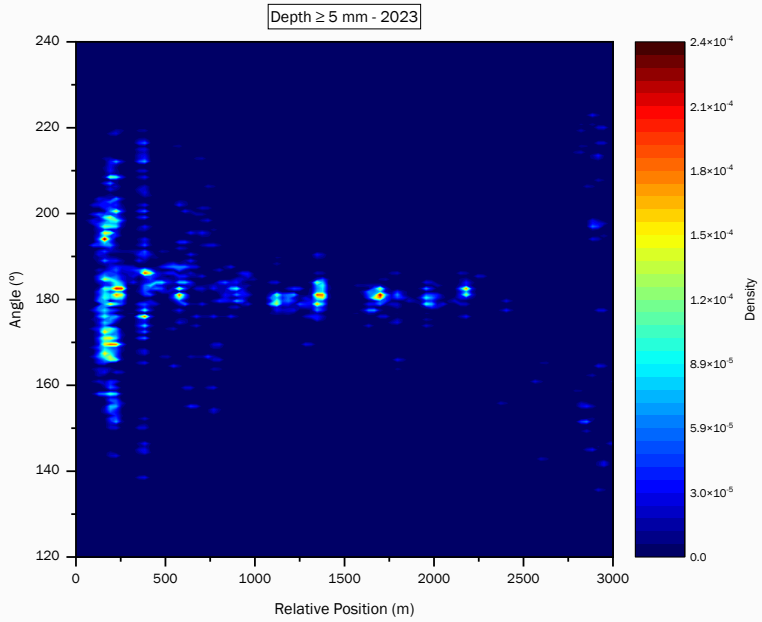
#	Angle	Length	Width	Depth	Position
1	6:15	22	24	3.15	1040.4
2	5:50	23	19	2.82	1043.6
3	7:10	15	14	1.58	1045.2





ILI pitting anomalies frequency distribution and angular distribution.
ILI raw data example and parameters schematic diagram



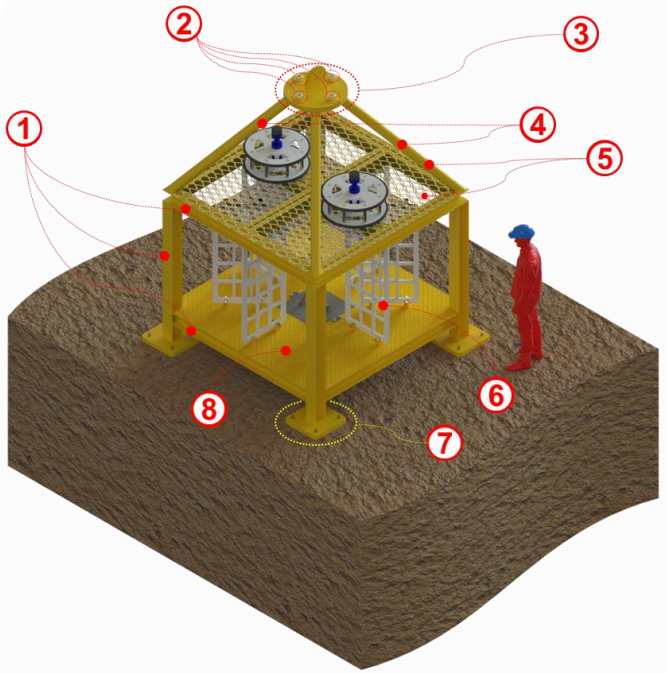


ILI pitting anomalies spatial distribution and KDE heatmap

Sizing and design of steel structures

Skids, tubular structures

Experienced in sizing and design of steel structures, including skids and tubular frameworks, ensuring structural integrity, load-bearing capacity, and compliance with relevant design standards and operational requirements.



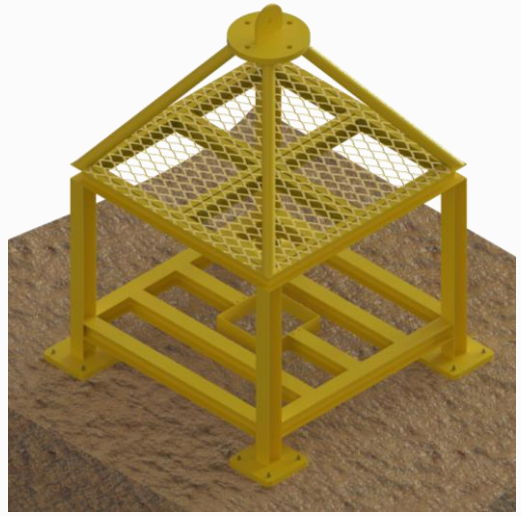
Base and columns		
Beam shape	A992 W6x20	
Height	157	mm
Width	153	mm
Web thickness	6.6	mm
Flange thickness	10.4	mm

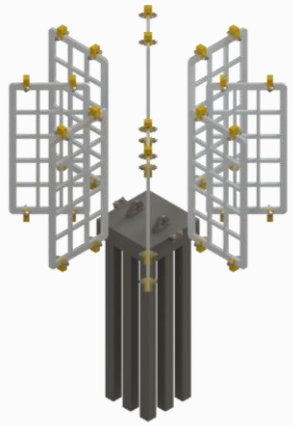
Padeye		
Material	SAE 1045	
Hole diameter	50	mm
Plate thickness	30	mm
Plate diameter	707	mm
Safety factor	2	

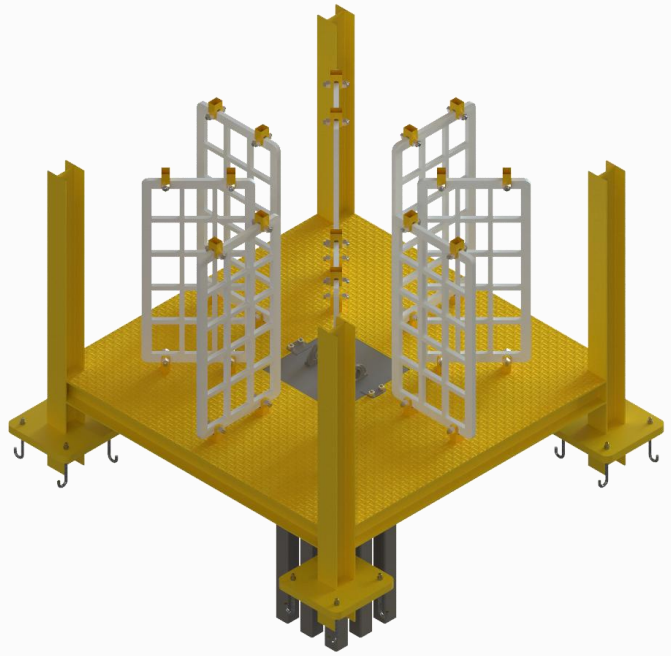
Joint tubes		
Shape	A53 Gr. B	
Outside diameter	114.3	mm
Thickness	8.56	mm
Length/part	1645.3	mm
Angle (diagonal)	43	°

P4 - SCH80

Isometric view of seabed skid and bill of materials







Detailed views of seabed skid